Evaluating the impact of ICT on teaching and learning: A study of Palestinian students' and teachers' perceptions

This study aimed to investigate the impact of ICT on teaching and learning from the point-of-view of Palestinian students and teachers. A total of 207 school teachers and 276 students from 53 schools taking part in an ICT project in Palestine responded to a questionnaire survey. Results indicated that students in Palestinian public schools perceived ICT to have a moderate influence on their learning. Students indicated that they face frequent challenges such as: lesson duration, access to modern devices and issues with information research skills. These results contrasted with school teachers' views, which reflected a much stronger impression of the influence of ICT on teaching.

Key words: Students' and teachers' perceptions, ICT in learning and teaching, evaluation of the use of ICT, students, teachers.

Introduction

Rapid developments in information and communication technology (ICT) mean that the last decade has witnessed increasing integration of various forms of technology in schools. This scientific and technical progress has arguably dominated all aspects of life, including methods of teaching. Although its role in the beginning was as an aid to the teacher and the textbook, its success was ultimately linked to the teacher's belief in its classroom usefulness (Bashir, 1988). Today, the use of ICT in the service of education in public schools is inescapable. This is due to the fact that societies need people who are able to cope with the changes, challenges and developments of the age, and not least of all, it highlights the growing need for a skilled workforce. A study examining the proportion of skilled workers in the American labour-force between 1950 and 2000 showed a rise from 20% in 1950 to 45% in 1991, and a further increase to 65% of the total American labour-force by 2000. The study also points to a decline in unskilled labour. In 1950, this category represented 60% of the work-force, while in 2000 it had decreased to 15% (Fagan and Lunley, 1995). These trends reflect growing worldwide interest in the use of technology in education. For many years now, international and regional conferences have highlighted the need to develop educational curricula which employ technology in the service of education. UNESCO emphasized this at the First International Conference on Technical and Vocational Education in Berlin, Germany in 1987, and subsequently at the International Project on Technical and Vocational Education in 1992, in Australia in 1998, and in Greece, the United Arab Emirates, Ecuador, Kenya, and again in 1999 at the Second Technical and Vocational Education Conference held in Seoul, Korea (UNESCO,1999).

The evolving ICT context

The public schools governed by the Palestinian Ministry of Education and Higher Education have not been isolated from these developments. The use of technology in the service of education has been of great interest. Educational plans and programs

were developed to serve the needs of current and future labor-markets by promoting research and other efforts aimed at encouraging the adoption of basic education which employed modern technologies in the classroom. Large investments were made to integrate ICT throughout Palestinian education. For instance, the Palestinian government and Ministry of Education (MOE) established a plan to integrate new ICT in education with a special focus on elementary schools. New technologies included, for example, tablets, e-school gates, interactive LCDs, smart TVs and the internet, etc. The use of websites and electronic portals is now regarded as an essential element of educational practice and a hallmark that distinguishes successful educational institutions. Furthermore, it is widely believed to develop teachers' scientific and technological competences, especially in terms of enabling them and school administrators to communicate professionally with students and their parents, and to maintain student records. Palestine is considered one of the most developed countries in the Middle East region in terms of the number of Internet users, the existence of infrastructure designed to connect schools to the Internet over the next 3-5 years, and the state's commitment to establishing a new communication portal for schools, students and parents. The MOE is now so well advanced with regard to ICT planning and implementation that Palestine is currently a candidate for setting up a unified portal that combines all public schools under the supervision and guidance of the Ministry of Education.

There is no doubt that the concept of technology was linked to industry for around a century-and-a-half before it entered the world of education. When it eventually did, its role was largely restricted to a range of display and recording devices such as televisions and tape recorders, and other tools which were rarely designed for the specific purpose of supporting teaching and learning. Early experimentation and growing technological appetites saw the introduction of new audio-visual teaching techniques. Successive educational developments, accompanied by advances in educational theory and psychology eventually led to more sophisticated approaches to the use of technology, and an awareness of the complexities involved.

Early conceptions of the role of technology in education reflected common understandings that equated technology with electronic machines and tools - aspects representing the concrete elements of technology used in daily life. Wider considerations concerning technology, in particular the need to carefully plan, manage and evaluate its role and use in the classroom to obtain desirable results, were generally neglected. Gradually, however, the importance of defining technology as "the systematic application of scientific knowledge" gained wider acceptance, based on a growing acknowledgement that ICT includes both theoretical and practical aspects, and the need for knowledge frameworks to support the effective application of ICT in learning environments. The field of educational technology depends on many different fields of knowledge - educational studies in particular and applied theoretical sciences in general – to build a knowledge-base for designing, developing, implementing and evaluating its use within the educational process. This way of thinking emphasises learning, implementation and evaluation in the light of specific objectives based primarily on research results in different areas of knowledge to access all available human and non-human resources that can maximise effective learning. Therefore, the technology of education is a renewable and vital science which does not stop at the limits of educational devices but is influenced by theoretical changes and evolving perspectives in the field, from the

School of Behavioural Psychology to the cognitive school and then to the structural school.

ICT in the service of education

Employing ICT in the service of education is one way of developing an individual's abilities. With the advent of the digital era, new technological implications and possibilities for teaching and learning are increasing throughout the world and at all levels of education. The Palestinian Ministry of Education and Higher Education has thus decided to introduce modern technology into its curricula and educational plans in order to enhance the teaching of all school subjects across the curriculum stages. This reflects the Ministry's desire and intention to enable teachers to interact effectively with the digital environment and to meet the challenges of the 21st century. The Ministry of Education and Higher Education recognizes the importance of employing ICT in the service of education as a positive force supporting the process of teaching and learning, at a time when many professionals in the field of educational technologies are expressing great hopes for the role they play in the educational process. Qiao (2009) found that the use of ICT in the service of education offers many wide-ranging benefits. These include increased potential for taking into account individual differences; providing feedback to the learner; increasing achievement in language learning; supporting the acquisition of learning skills and computer literacy; acquiring positive digital habits; speeding up the learning process; developing problem-solving skills; diversifying learning experiences; consolidating concepts; reinforcing historical learning; and reducing the burden on the teacher. The Palestinian Ministry of Education and Higher Education has thus stepped up its programme of employing ICT in the service of education across the various educational stages, especially in basic (elementary) education, where it has invested in computer programs to support teachers in the classroom.

The Impact of Integrating ICT into education

A number of studies have been conducted on the impact of integrating ICT in education systems. Bai, Mo, Zhang, Boswell and Rozelle (2016) found that integrating ICT in classroom teaching can be an effective means of improving student test scores when compared with schools that make little or no use of technology. Several studies suggest a widespread awareness among teachers that integrating ICT could improve teaching and learning by enhancing their teaching methods, and creating a more active and collaborative learning environment (Bindu, 2016; Mafuraga and Moremi 2017; Sangrà and Sanmamed, 2010; Yumurtaci,2017) although some studies have suggested that ICT do not have a great influence on students' outcomes (Comi, Gui, Origo, Pagani, & Argentin, 2016 ; Marcino, 2018; Ernst and Clark, 2012; Salomon and Kolikant, 2016; Steiner and Mendelovitch, 2017). Much research has also focused on the impact of ICT integration on students' performance. In a study conducted by Mbaeze, Ukwandu & Anudu (2010), the researchers found no statistically significant relationship between the inclusion of ICT and students' academic performance, but for those who are disadvantaged ICT remains a hope (BECTA, 2003; Çelik and Gündogdu, 2016; Khan, Khan, Din, and Ismail, 2015; Johnson, 2014; Lai, Luo, Zhang, Huang, & Rozelle, 2011; Mo, Huang, Shi, Zhang, Boswell, and Rozelle, 2015). Researchers have concluded that the value of ICT in education may lie more in its ability to make

teaching more efficient, varied and interesting (Hughes, 2005). Dina & Ciornei (2013) and Hismanoglu (2013) similarly support the benefits of ICT but argue that it cannot replace the role of teachers in cases where timely feedback to students is essential.

Challenges facing the integration of ICT in education

In its report (2013), UNESCO shows widespread availability of ICT support services throughout Palestine even though computer laboratories and LANs are less common. This indicates that Palestine is trying to use ICT in education effectively. Integrating ICT into education often faces several challenges, of course. One of the major challenges is developing and maintaining the infrastructure components related to ICT equipment (Alkahtani, 2017; Howie, 2010 Kipsoi et al. 2012; Leung et al., 2005;, Salehi and Salehi, 2012; Yunus, Lubis and Lin, 2009). In Frazee's (2004) research on ICT integration, educators and experts in the field of educational technology examined the importance of Web Quest in extending content knowledge and enhancing teaching and learning. Integrating Web Quest was shown to involve a number of challenges, one of which was a lack of systematic descriptions and guidance on supporting learner interactions with well-designed Web Quest applications and models. To date, there have been few scholarly studies on Web Quest, which may impede practitioners interested in using this approach in designing and delivering effective Web-enhanced guidance for teaching and learning. According to Sife et al. (2007), there are three pedagogical design challenges faced by Web Quest models: enhancing learners' personal agency beliefs; sustaining learner engagement; and promoting learners' deep understanding and critical thinking (Williams and Boyle, 2008). Other challenges include teacher 'comfortability', teacher confidence and teacher competence. Several studies have indicated that a lack of confidence often prevents teachers from using ICT in their teaching (Alkahtani, 2016; Peeraer and Van Petegem, 2011). In terms of the availability of computers, communication networks and laboratories, the statistical report showed that the average number of students per computer in all districts in Palestine was 24.6, while the proportion of all schools connected to the Internet was 77.9% (72.6% when private schools are excluded).

The above studies clearly highlight the importance of reviewing and evaluating teachers' and students' experiences of and perspectives on ICT. Our own experiences of Palestinian classrooms heightened this interest - discussions with teachers over time suggested that integrating ICT in education was an aspiration for them, yet day-to-day interactions and observations revealed little evidence of this in practice. This situation thus prompted the researchers to explore the reality of ICT integration and experiences in education, and as such, the study addresses the following three research questions that underpinned our enquiry:

(*1) How do students in Palestinian public schools perceive the impact of ICT on their learning?*
(2) What are the most frequent challenges facing ICT use from the *viewpoint of students in Palestinian government schools?*
(3) How do teachers' in Palestinian public schools view the impact of ICT on their teaching?

These questions thus provide a basis for evaluating ICT integration in public schools and for understanding staff and student perspectives.

Methodology

In the north of Palestine, there are 53 primary schools. In 2017-18, the academic year in which the study was carried out, 2071 students attended these schools, which employed a total of 414 teachers. The study's sample therefore draws on 50% of the region's primary school teacher population, and 18% of its student population.

Questionnaire surveys were conducted to collect data from the sampled students and teachers. Details of the sample are shown in Table 1. Teachers and students were asked to express their views by completing the questionnaires. The items and domains were designed to solicit teachers' and students' perceptions of the impact of the ICT on teaching and learning, the challenges they experienced, and the realities of using technology. SPSS software was used to analyze the data.

Table 1. Details on the sample and population

#	Description	Number of teachers	Number of students
1	Population	414	2071
2	Sample	207	376
3	Number of returned questionnaires	201	354
4	Percentage of returned questionnaires	97%	94%
5	Percentage of sample	50%	18%

The questionnaire was based on research studies conducted by Bai, Mo, Zhang, Boswell and Rozelle (2016), Banerjee et al. (2007), and Copriady (2014) which focused on students' perceptions of the impact of ICT on their learning, the challenges they faced and the realities of using technology. The Cronbach's alpha reliability coefficient for the questionnaire is 0.76.

Results and discussion

Impact on students' learning

Students were surveyed in order to gain an impression of their perceptions of *the impact of ICT on their learning in Palestinian public schools.* Table 2 shows the results.

Table 2. Survey of results of perceptions of students in Palestinian public schools on the impact of ICT on their learning.

NO	Item	Means	Percentages	Level
1	I learn computer skills inside school much more than outside school.	2.31	58%	Low
2	School website helps me initiate and participate in online discussions	2.77	69%	Moderate
3	Using online resources made me neglect important traditional learning resources (books...)	1.88	47%	Very low
4	I understand difficult vocabularies in lessons when I use YouTube	2.99	75%	High
5	When teachers use computers inside class this hinders my development of interpersonal skills	1.96	49%	Very low
6	Using interactive LCDs de-motivates and discourages me to learn	1.83	46%	Very low
7	E-mails are very helpful in having feedback about what I learned.	2.72	68%	Moderate
8	The smart board increases academic achievement (e.g. grades).	2.88	69%	Moderate
9	My knowledge of the lesson increases when teachers use internet inside classrooms	2.81	70%	High
10	School's educational forum improves my learning of critical concepts and ideas.	2.73	68%	Moderate
11	Technology gives opportunities for students communicate effectively and freely with instructor	2.81	70%	High
12	School portal helps me receive assignments and feedback online	1.76	43%	Very low
	Total score	2.40	61%	Moderate

As stated, students at public schools were surveyed to capture an impression of their perceptions of the impact of ICT on their learning. As table 2 shows, the results revealed an overall mean value of 2.40 with 61% of all questions. The results suggest that students perceived the impact of ICT on their learning to be moderate. Students believed incorporating the internet within classrooms is important as it

increases their knowledge of the lesson content. A large number of students (70%) suggested technology provides opportunities for them to communicate effectively and freely with their teachers. This may be because speaking in front of others in the class may be difficult for some students. As item 11 suggests, students had a better chance to communicate effectively with their teachers using social media. They do not feel shy and communicate freely. When asked about the role of smart boards, they indicated that it increases their achievement. Students appreciated making use of the internet in class (such as using YouTube) as it facilitates learning difficult words. But, as shown, the mean of items 1, 3, 5, 6, and 12 was low. A moderate number of students' responses show that using the school website encourages them to be involved in online discussions, as item 2 shows. Schools' educational forums seem to moderately influence students' critical understanding of concepts, as item 10 shows (M= 2.73, 68%). These results concur with the studies undertaken by Batdi (2017), Dema and Moeller (2013), Kabooha (2018), Kong and Song (2015) and Ryan (2013).

Challenges that limit the use of ICT in the service of the education in Palestine

Students were surveyed to examine the challenges they perceived to limit the educational use of ICT in Palestinian government schools. The results were achieved by calculating the means and percentages for each questionnaire item. Students were asked to identify the challenges they face in learning activities (5-point Likert scale from 1 = strongly disagree to 5 = strongly agree). Table 3 shows the most frequent challenges facing ICT use from the pupils' perspectives.

Table 3. Students' perspectives on the most frequent challenges facing ICT use.

NO	Item	Means	Percentages	Level
1	I see that teachers are unable to use internet inside class.	1.54	39%	Very Low
2	The curriculum is designed to implement the use of ICT	1.97	49%	Very Low
3	Lesson time is long enough to use ICT	2.27	57%	Low
4	Classrooms are well designed to suit an ICT environment	2.41	60%	Moderate
5	I have information searching skills	2.27	57%	Low
6	The number of PCs at my school is not enough	2.37	59%	Low
7	We have up-to-date devices and teachers use them efficiently	2.32	58%	Low
8	I am trained well to use YouTube	2.60	65%	Moderate
9	Teachers restrict us from using PCs during class or study periods	2.33	58%	Low
	Total score	2.30	57%	Low

According to table 3, students reported that they face several challenges with ICT. For example, relatively few pupils felt that the curriculum leant itself to using ICT (M= 1.97, 49%). They also indicated that class time does not allow them sufficient opportunities to utilise the ICT provided by teachers (M=2.27, 57%). Using up-to-date devices was felt to be a considerable challenge by teachers and students. When asked about their searching skills, students showed that they do not have enough experience. It seems that students are moderately accustomed to the use of YouTube, however. This may be because the majority of students are familiar with such applications at home. As students mentioned, classroom environments were generally considered suitable for ICT use, and the number of available PCs was felt to be sufficient. These issues were also identified by Abdul Razzak (2015); Bello, Hassan, Yunusa, Abdulrashid, Usman and Nasidi (2017); Siri and Shang (2018).

Impact of ICT on teaching

Table4. Palestinian public schoolteachers' views on the impact of ICT on their teaching

NO	Item	Means	Percentages	Level
1	The use of ICT has influenced my teaching positively so that students become critical thinkers and able to make decisions	04.2	84.3 %	Very High
2	ICT has helped me move towards my curricular goals.	04.0	79.7%	High
3	I feel comfortable and confident with the use of ICT	3.80	76.0 %	High
4	I feel comfortable with the pedagogical aspects of ICT.	03.8	75.0%	High
5	My students showed technical skills that I had not taught them.	03.7	74.3 %	High
6	Students with learning disabilities in my class were involved when I used ICT	03.7	74.3%	High
7	My students were motivated when using ICT	03.5	69.3%	High
8	Technical issues got resolved promptly when I needed help.	03.4	67.3%	High
9	ICT was difficult to access.	03.3	65.0%	Moderate
10	My students were frustrated with the ICT tools available	03.2	64.7%	Moderate
	Total score	**3.66**	**74.1%**	**High**

The mean value of teachers' responses concerning their views on the impact of ICT on their teaching (calculated against the 5-point Likert scale from 1 = *strongly disagree* to 5 = *strongly agree*) was 3.66 with a percentage of 74.1%, as shown in

Table 4. Teachers reported that ICT was a strongly positive influence on their teaching, as illustrated by the high levels of agreement they expressed in relation to the first few questionnaire items, as shown above (e.g. the positive impact of ICT implementation on their teaching, where the majority of teachers' responses ranged from M= 03.4, 67.3% - M= 04.0, 79.7%. They also indicated that ICT was moderately difficult to access (*M*=03.3, 65.0%) as well as suggesting that a moderate number of students were frustrated with the use of the ICT tools available. These results concur with Alshmrany and Wilkinson (2017); Abed (2018); and Saadati, Tarmizi, Mohd Ayub (2015).

Conclusion and recommendations

This study explored students' perceptions of using ICT in learning at schools and the challenges facing them. It also focused on the implementation of ICT in school education from teachers' perspectives.

The results indicate that implementing and supporting the integration of internet services and other ICT tools such as smart boards in primary school classrooms is important for students, in that it will arguably support them in learning languages better, interacting, being more motivated, communicating effectively, e-mailing, thinking critically in schools forums and exchanging ideas.

The most frequent challenges that students report when using ICT are the lack of training on the implementation of such tools and the physical environment of their classrooms which are not designed for such integration. The results of this study indicate that the Ministry of Education (MOE) should consider the availability of ICT tools in all schools in Palestine; and enable schools to subscribe to online libraries providing access to e-learning environments both at home and in school. The MOE could usefully establish a proactive e-learning policy on the integration of ICT at schools. This would enable students and teachers to extend their learning, and teachers to become more effective facilitators of their students' learning at school. Palestinian schools should carefully consider how they might adopt a more holistic policy to address the challenges students face. This would arguably enable learners, teachers and schools to be more proactive. Given that teachers perceive ICT to be a strong influence on their teaching, attempts by the MOE to enhance e-learning for school students and teachers would be welcome. Teachers and students should be encouraged to maximise collaboration and share their experiences of implementing ICT in teaching and learning. More efforts in this domain would be beneficial.

There is clearly a role for the MOE to play in supporting teachers and students in the use of ICT in school and also at home. One recommendation for teachers would be to consider strategies for initiating policies that allow them to adopt more active roles with regard to: implementing ICT activities during lessons; supporting the use of ICT for learning; using methods that support interactive learning; motivating students to be involved; and reappraising the methods by which they are better able to meet students' learning needs (Barham, 2014; Hernandez, 2017**;** Kong et al., 2014; Qteefan, 2012).

There is a pressing need for the MOE and schools to address the challenges facing students, and to ensure greater access to ICT resources for all. With greater ICT

provision, schools will be better able to support students with disabilities and to boost achievement. With suitable MOE and school policies in place, schools will be well positioned to become more responsive and proactive in dealing with challenges facing both students and teachers. A positive partnership between teachers, students and the MOE relies on greater collaboration using interactive technologies and expert support from the MOE. With this, teachers and students will all develop a stronger understanding of ICT in the context of education, and how it can positively support learning and teaching. This understanding will, as discussed, contribute to improvements in achievement, inclusion and student support. This study also suggests that improved student motivation is a further desirable consequence of a sustained approach to integrating ICT in education.

Future studies could use this evaluation of ICT challenges, experiences and impact as a basis for considering the effectiveness of ICT-based learning policies aimed at schools and home usage. Further ICT studies using quasi-experimental research approaches conducted with teachers and students would be welcome, as would a greater provision of training sessions aimed at supporting teachers in ICT practices and approaches. Another recommendation would be for curriculum planners to focus more explicitly and carefully on ICT integration when formulating learning and teaching polices. Attention is additionally required with regard to school infrastructure in order to ensure and support stronger ICT awareness, training, usage and resource availability. Finally, the authors hope that the study will be a further prompt for the MOE to enhance teachers' and students' use and understanding of ICT in the digital age in which we all live.

Disclosure statement

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